

DATA SHEET

NEC

GaAs HBT INTEGRATED CIRCUIT

μPG2318T5N

2.4 GHz SINGLE BAND POWER AMPLIFIER FOR W-LAN

DESCRIPTION

The μPG2318T5N is a GaAs HBT MMIC power amplifier for 2.4 GHz band wireless LAN.

This device realizes high efficiency, high gain and high output power by using InGaP HBT.

This device is housed in a 6-pin plastic TSON (Thin Small Out-line Non-leaded) package. And this package is able to high-density surface mounting.

FEATURES

- Operating frequency : $f_{opt} = 2\ 400$ to $2\ 500$ MHz (2 450 MHz TYP.)
- Supply voltage : $V_{cc1, 2} = 3.0$ to 4.6 V (3.3 V TYP.)
- Control voltage : $V_{enable} = 0$ to 3.0 V (2.8 V TYP.)
- Circuit current : $I_{cc} = 120$ mA TYP. @ $V_{cc1, 2} = 3.3$ V, $V_{enable} = 2.8$ V,
 $P_{out} = +18$ dBm (at OFDM modulation : 64QAM/54 Mbps)
- Power gain : $G_P = 28$ dB TYP. @ $V_{cc1, 2} = 3.3$ V, $V_{enable} = 2.8$ V,
 $P_{out} = +18$ dBm (at OFDM modulation : 64QAM/54 Mbps)
- Gain flatness : $\Delta G_P = 0.8$ dB TYP. @ $f = 2.4$ to 2.5 GHz, $V_{cc1, 2} = 3.3$ V, $V_{enable} = 2.8$ V,
 $P_{out} = +18$ dBm (at OFDM modulation : 64QAM/54 Mbps)
- Error vector magnitude : $EVM = 2.5\%$ TYP. @ $V_{cc1, 2} = 3.3$ V, $V_{enable} = 2.8$ V,
 $P_{out} = +18$ dBm (at OFDM modulation : 64QAM/54 Mbps)
- Harmonics : $2f_0 = 30$ dBc TYP. @ $V_{cc1, 2} = 3.3$ V, $V_{enable} = 2.8$ V,
 $P_{out} = +18$ dBm (at OFDM modulation : 64QAM/54 Mbps)
- High-density surface mounting : 6-pin plastic TSON package ($1.5 \times 1.5 \times 0.37$ mm)

APPLICATION

- Power Amplifier for 802.11b/g

ORDERING INFORMATION

| Part Number | Order Number | Package | Marking | Supplying Form |
|---------------|-----------------|---------------------------------|---------|--|
| μPG2318T5N-E2 | μPG2318T5N-E2-A | 6-pin plastic TSON (Pb-Free) | G5G | <ul style="list-style-type: none">• Embossed tape 8 mm wide• Pin 1, 6 face the perforation side of the tape• Qty 3 kpcs/reel |

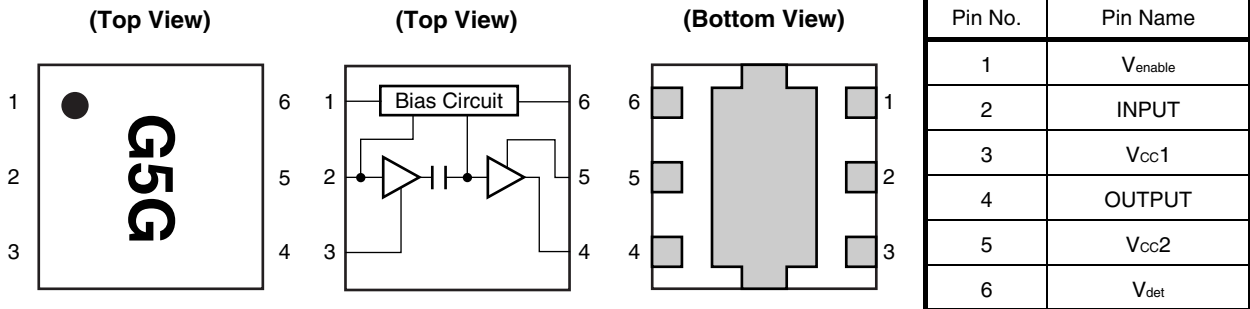
Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order: μPG2318T5N

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

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Not all products and/or types are available in every country. Please check with an NEC Electronics sales representative for availability and additional information.

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM



Remark Exposed pad : GND

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C, unless otherwise specified)

| Parameter | Symbol | Ratings | Unit |
|-------------------------------|---------------------|---------------------|------|
| Supply Voltage | V _{cc1, 2} | 5.0 | V |
| Control Voltage | V _{enable} | 4.0 | V |
| Input Power | P _{in} | +10 | dBm |
| Power Dissipation | P _D | 500 ^{Note} | mW |
| Operating Ambient Temperature | T _A | -45 to +85 | °C |
| Storage Temperature | T _{stg} | -55 to +150 | °C |

Note Mounted on double-sided copper-clad 50 × 50 × 1.6 mm epoxy glass PWB, T_A = +85°C

RECOMMENDED OPERATING RANGE (T_A = +25°C, unless otherwise specified)

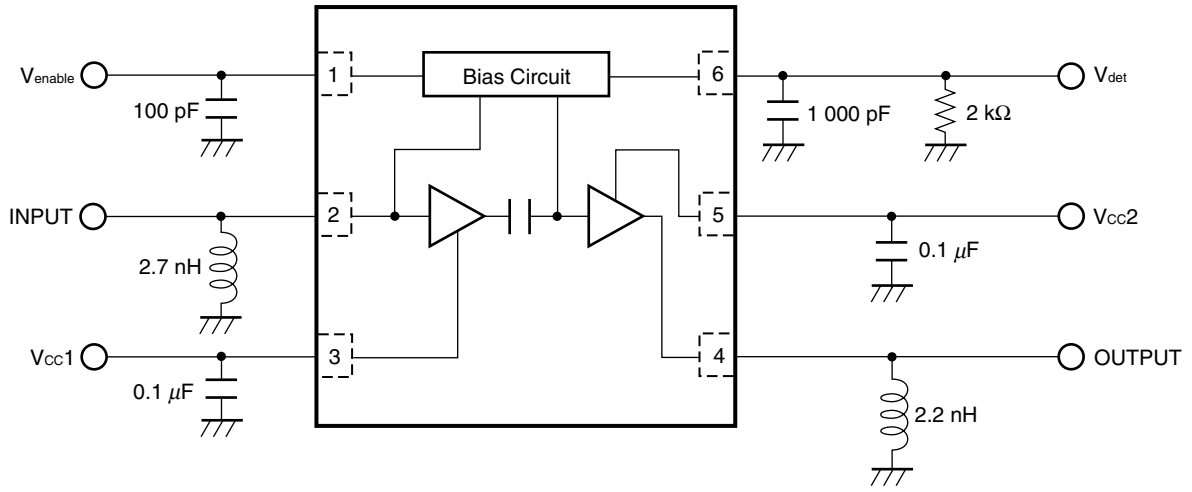
| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|---------------------|---------------------|-------|-------|-------|------|
| Operating Frequency | f _{opt} | 2 400 | 2 450 | 2 500 | MHz |
| Supply Voltage | V _{cc1, 2} | 3.0 | 3.3 | 4.6 | V |
| Control Voltage | V _{enable} | 0 | 2.8 | 3.0 | V |

ELECTRICAL CHARACTERISTICS

(T_A = +25°C, f = 2 400 to 2 500 MHz, OFDM modulation : 64QAM/54 Mbps, V_{cc1, 2} = 3.3 V, V_{enable} = 2.8 V, external input and output matching, unless otherwise specified)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|------------------------|---------------------|--|------|------|------|------|
| Circuit Current | I _{cc} | P _{out} = +18 dBm | – | 120 | 140 | mA |
| Power Gain | G _P | P _{out} = +18 dBm | 25.5 | 28 | – | dB |
| Gain Flatness | ΔG _P | P _{out} = +18 dBm | – | 0.8 | 1.3 | dB |
| Control Current | I _{enable} | P _{out} = +18 dBm | – | 3.2 | – | mA |
| Error Vector Magnitude | EVM | P _{out} = +18 dBm | – | 2.5 | – | % |
| Input Return Loss | RL _{in} | P _{out} = –30 dBm (no-modulation) | – | 15 | – | dB |
| Output Return Loss | RL _{out} | P _{out} = –30 dBm (no-modulation) | – | 5 | – | dB |
| 2nd Harmonics | 2f ₀ | P _{out} = +18 dBm | – | 30 | – | dBc |
| 3rd Harmonics | 3f ₀ | P _{out} = +18 dBm | – | 48 | – | dBc |
| Power Detector Voltage | V _{det} | P _{out} = +18 dBm | – | 0.7 | – | V |

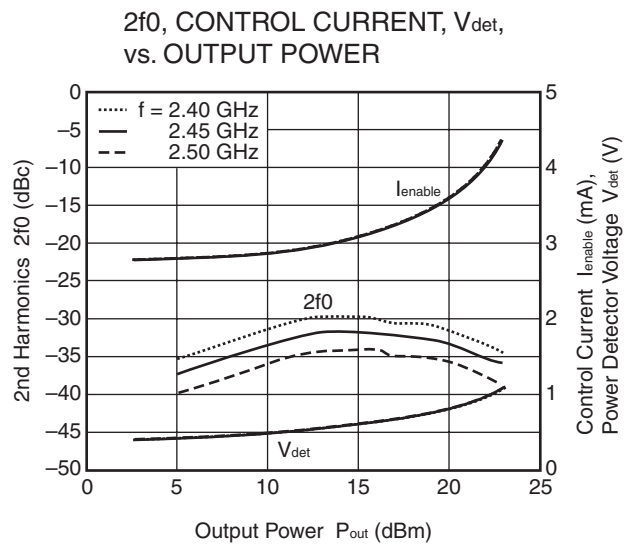
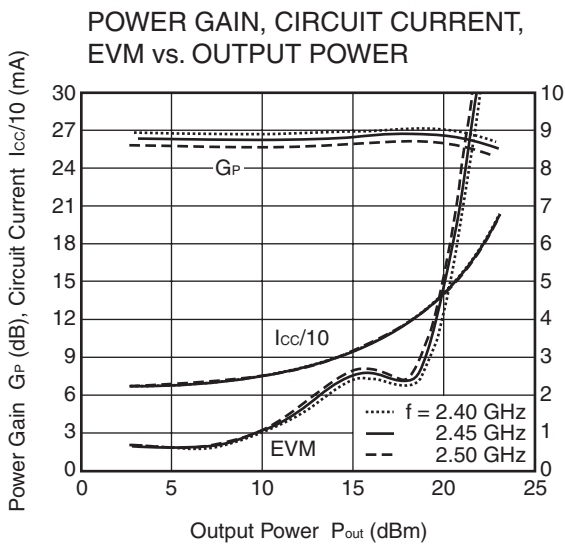
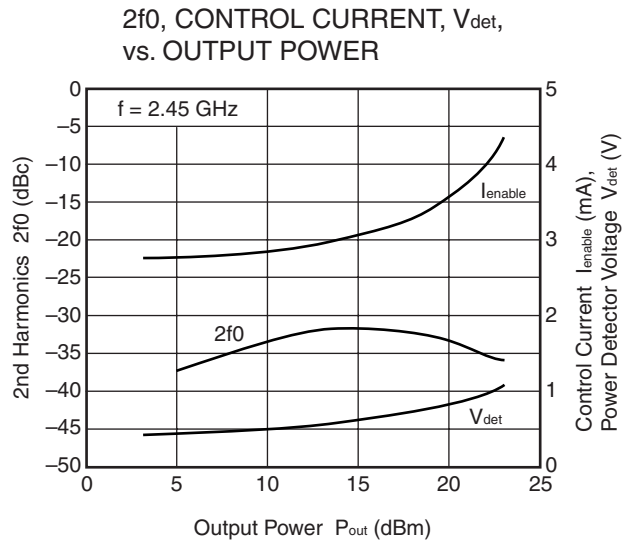
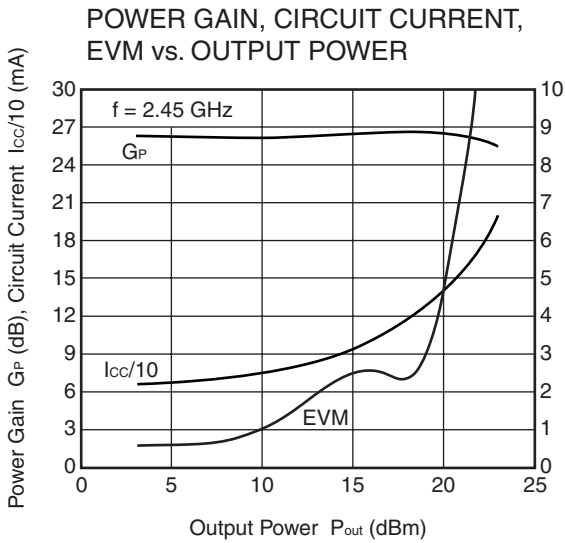
EVALUATION CIRCUIT



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

TYPICAL CHARACTERISTICS 1

($T_A = +25^\circ\text{C}$, $V_{CC1, 2} = 3.3\text{ V}$, $V_{enable} = 2.8\text{ V}$, OFDM modulated signal : 64QAM/54 Mbps, with external input and output matching circuits, unless otherwise specified)

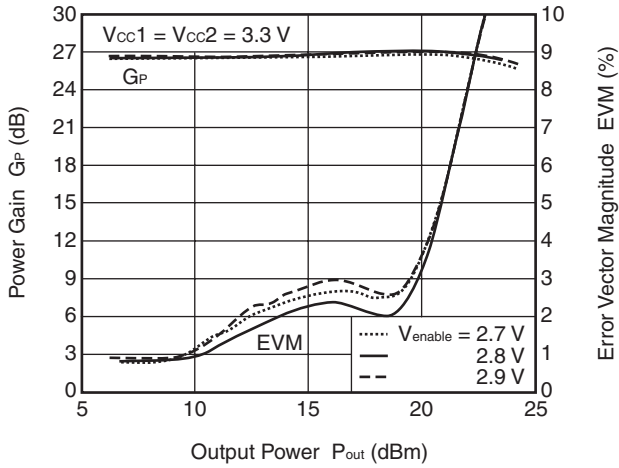


Remark The graphs indicate nominal characteristics.

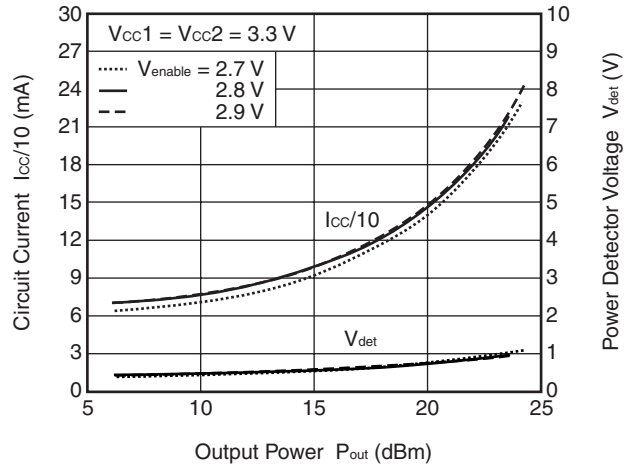
TYPICAL CHARACTERISTICS 2

($T_A = +25^\circ\text{C}$, $f = 2.45\text{ GHz}$, OFDM modulated signal : 64QAM/54 Mbps, with external input and output matching circuits, unless otherwise specified)

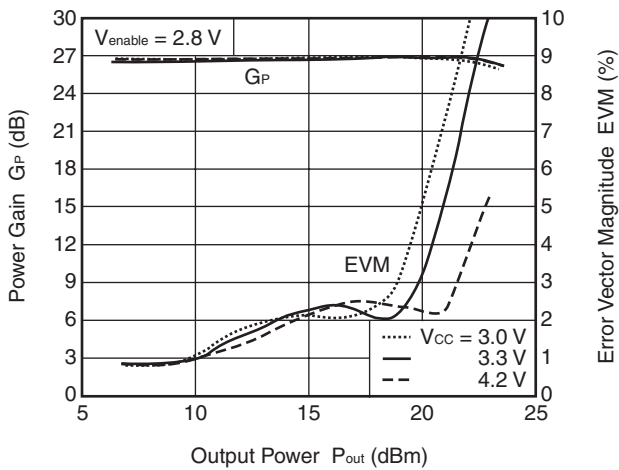
POWER GAIN, EVM vs. OUTPUT POWER



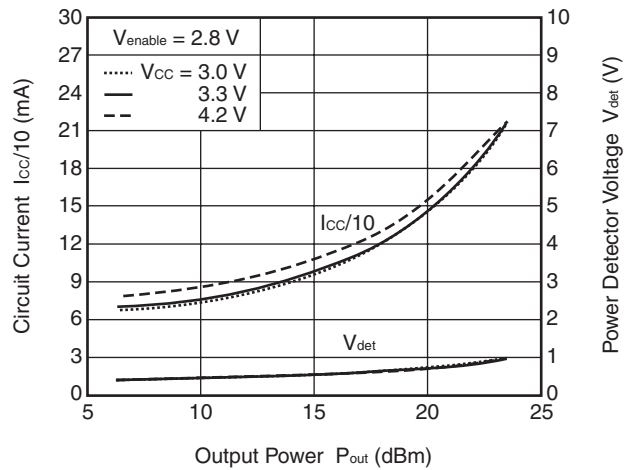
CIRCUIT CURRENT, V_{det} , vs. OUTPUT POWER



POWER GAIN, EVM vs. OUTPUT POWER



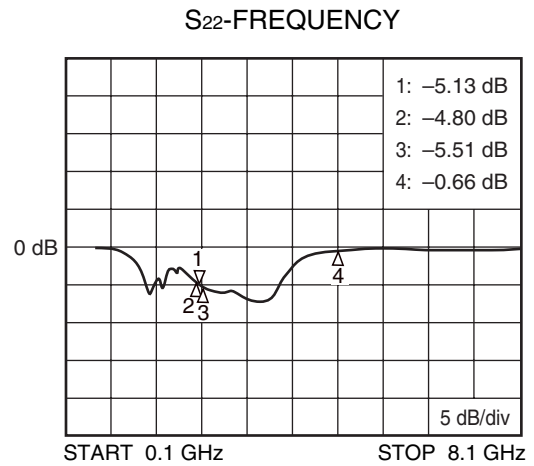
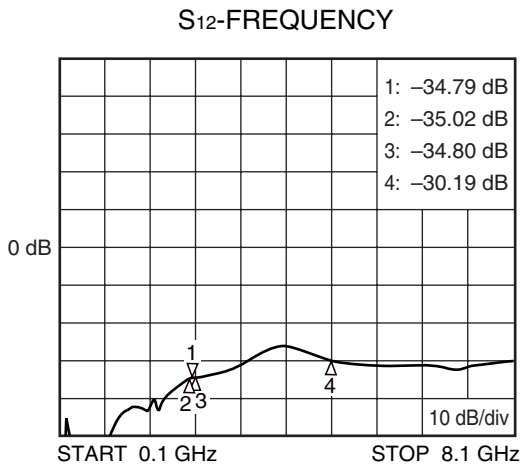
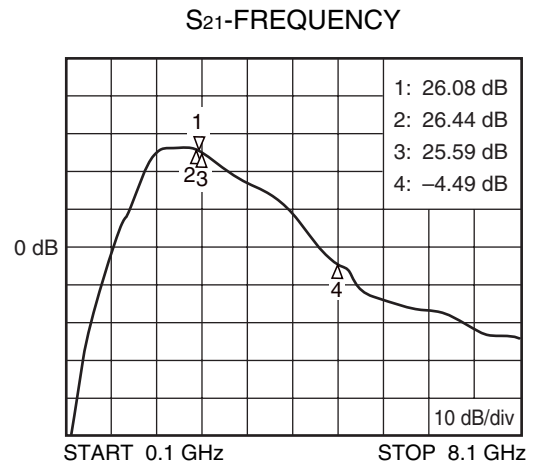
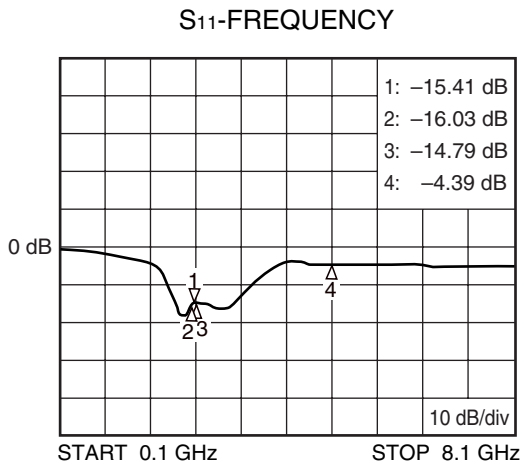
CIRCUIT CURRENT, V_{det} , vs. OUTPUT POWER



Remark The graphs indicate nominal characteristics.

S-PARAMETERS (Reference Data) –This data is included external matching components–

Condition : T_A = +25°C, f = 0.1 to 8.1 GHz, V_{cc1, 2} = 3.3 V, V_{enable} = 2.8 V, P_{in} = -30 dBm

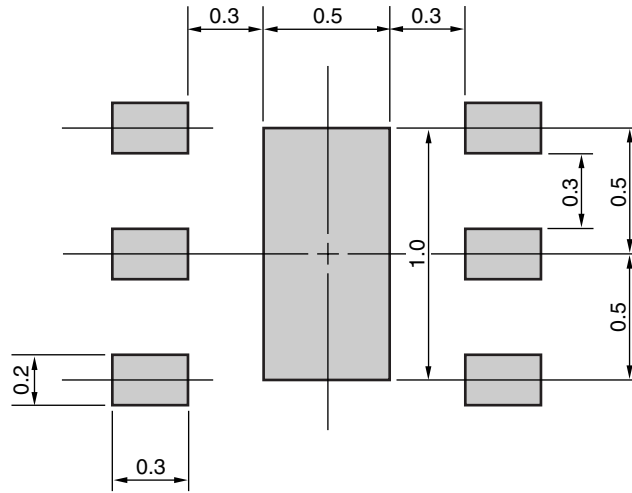


- Remark 1.** The graphs indicate nominal characteristics.
- 2.** Marker1 : 2.45 GHz
 - Marker2 : 2.40 GHz
 - Marker3 : 2.50 GHz
 - Marker4 : 4.90 GHz

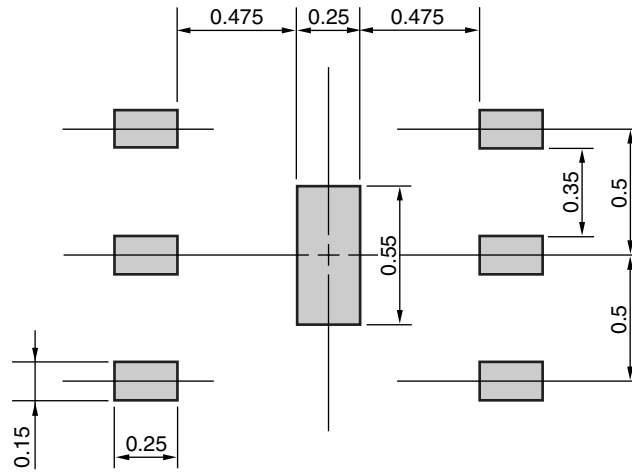
MOUNTING PAD AND SOLDER MASK LAYOUT DIMENSIONS

6-PIN PLASTIC TSON (UNIT: mm)

MOUNTING PAD



SOLDER MASK

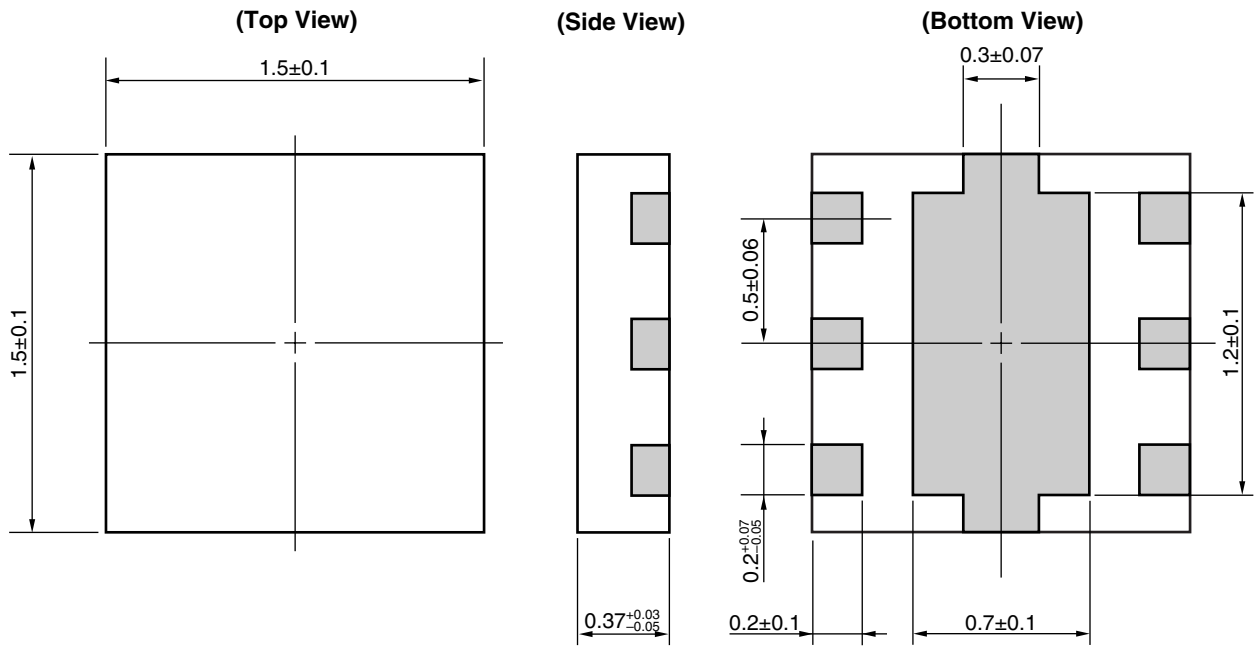


Solder thickness : 0.08 mm

Remark The mounting pad and solder mask layouts in this document are for reference only.

<R> PACKAGE DIMENSIONS

6-PIN PLASTIC TSON (UNIT: mm)



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

| Soldering Method | Soldering Conditions | Condition Symbol |
|------------------|---|------------------|
| Infrared Reflow | Peak temperature (package surface temperature) : 260°C or below Time at peak temperature : 10 seconds or less Time at temperature of 220°C or higher : 60 seconds or less Preheating time at 120 to 180°C : 120±30 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | IR260 |
| Wave Soldering | Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | WS260 |
| Partial Heating | Peak temperature (terminal temperature) : 350°C or below Soldering time (per side of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | HS350 |

Caution Do not use different soldering methods together (except for partial heating).

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| | |
|-------------------------------------|---|
| <p>Caution GaAs Products</p> | <p>This product uses gallium arsenide (GaAs). GaAs vapor and powder are hazardous to human health if inhaled or ingested, so please observe the following points.</p> <ul style="list-style-type: none"> • Follow related laws and ordinances when disposing of the product. If there are no applicable laws and/or ordinances, dispose of the product as recommended below. <ol style="list-style-type: none"> 1. Commission a disposal company able to (with a license to) collect, transport and dispose of materials that contain arsenic and other such industrial waste materials. 2. Exclude the product from general industrial waste and household garbage, and ensure that the product is controlled (as industrial waste subject to special control) up until final disposal. • Do not burn, destroy, cut, crush, or chemically dissolve the product. • Do not lick the product or in any way allow it to enter the mouth. |
|-------------------------------------|---|